

In the Specification

Kindly replace paragraph [0001] with the following:

Related Applications

This application is a §371 application of International Application No. PCT/JP2004/19052, with an international filing date of December 21, 2004 (WO 2005/063496, published July 14, 2005), which is based on Japanese Application No. 2003-431981 filed December 26, 2003.

[Field of the Invention] Technical Field

This ~~invention~~ disclosure relates to a biaxially oriented white polypropylene film for thermal transfer recording and a receiving sheet for thermal transfer recording using the same. In more detail, the receiving sheet for thermal transfer recording using the white film ~~of this invention~~ as a substrate is high in sensitivity, excellent in crease resistance, surface appearance and processability. ~~And, this invention~~ The disclosure also relates to a biaxially oriented white polypropylene film (hereafter, may simply be abbreviated as "white film") most suitable for a substrate of receiving sheet for thermal transfer recording and the receiving sheet for thermal transfer recording using the same which has compatibility of those characteristics with a high productivity at its production.

Kindly replace paragraph [0003] with the following:

As a substrate of the receiving sheet conventionally used for such a thermal transfer recording system, a white film in which voids were formed by including an immiscible resin, such as an inorganic particle or polyester based resin in polypropylene, and exfoliating the interface between the polypropylene and the inorganic particles or the immiscible resin at stretching process, has been applied (for example, ~~refer to patent references 1 to 8~~ Japanese Patent No. 2599934, Japanese Patent No. 1748101, Japanese Patent Laid Open No. Hei 11-343357, Japanese Patent No. 2611392, Japanese Patent No. 2917331, Japanese Patent No. 2964608, Japanese Patent No. 2735989 and Japanese Patent No. 2651469).

Kindly replace paragraph [0005] with the following:

As the white film or the micro-porous film using the crystal transition of β -crystal and its manufacturing method, for example, a manufacturing method of polypropylene micro-porous film obtained by stretching a polypropylene sheet which consists of polypropylene and a polymer with melt crystallization temperature higher than the polypropylene and β -crystal nucleating agent (~~refer to patent reference 9~~ Japanese Patent No. 1974511), or a method for manufacturing a micro-porous film obtained by melt extrusion of a specified composition of polypropylene and an amide based β -crystal nucleating agent and by crystallizing-stretching in a specified condition (~~refer to patent reference 10~~ Japanese Patent No. 3443934), or a micro-porous film obtained by biaxially stretching a sheet having a specific pore size and a specific nitrogen transmission coefficient, having a specific stretching strength with a uniform planer mechanical properties within the field and having a β -crystal ratio (K value), measured in specific conditions, of a specific range (~~refer to patent reference 11~~ Japanese Patent No. 2509030), or a micro-porous film containing polypropylene and a β -crystal nucleating agent and having a thickness uniformity of a specific range and having a specific cross-sectional structure (~~refer to patent reference 12~~ International Publication WO 02/66233), or a manufacturing method of a micro-porous film by melt molding a resin composition of polypropylene, polyethylene and a β -crystal nucleating agent of a specific composition, and then stretching under specific conditions (~~refer to patent reference 13~~ Japanese Patent No. 3523404), or a white film in which a skin layer having heat-sealability or printability is laminated at least on one side of the core layer which consists of an orientation enhancing polymer, homopolypropylene and β -crystal nucleating agent (~~patent references 14 and 15~~ International Publication WO 03/93003 and International Publication WO 03/93004), or a white film, having a specific gravity, optical density, and a cushion factor, containing a specific amorphous polymer, which consists of a layer of which β -crystal ratio is in a specific range, and a layer containing non-nucleus voids, (~~refer to patent reference 16~~ Japanese Patent Laid Open No. 2004-142321) or the like are mentioned.

~~{Patent reference 1}~~ Japanese Patent No. 2599934 (claim 1)

~~{Patent reference 2}~~ Japanese Patent No. 1748101 (claims 1 to 15)

~~{Patent reference 3}~~ Japanese Patent Laid Open No. Hei 11-343357 (claims 1 to 4)

~~{Patent reference 4}~~ Japanese Patent No. 2611392 (claims 1 and 2)

~~{Patent reference 5} Japanese Patent No. 2917331 (claims 1 to 4)~~
~~{Patent reference 6} Japanese Patent No. 2964608 (claims 1 to 5)~~
~~{Patent reference 7} Japanese Patent No. 2735989 (claims 1 and 2)~~
~~{Patent reference 8} Japanese Patent No. 2651469 (claims 1 and 2)~~
~~{Patent reference 9} Japanese Patent No. 1974511 (claim 1)~~
~~{Patent reference 10} Japanese Patent No. 3443934 (claims 1 to 5)~~
~~{Patent reference 11} Japanese Patent No. 2509030 (claims 1 to 8)~~
~~{Patent reference 12} International Publication WO02/66233 (claims 1 to 11)~~
~~{Patent reference 13} Japanese Patent No. 3523404 (claim 1)~~
~~{Patent reference 14} International Publication WO03/93003 (claims 1 to 29)~~
~~{Patent reference 15} International Publication WO03/93004 (claims 1 to 23)~~
~~{Patent reference 16} Japanese Patent Laid Open No. 2004-142321 (claims 1 to 8)~~

Kindly replace paragraph [0006] with the following:

~~{Disclosure of the Invention}~~

~~{Problem(s) to be Solved by the Invention}~~

However, in the white film or micro-porous film in which the above-mentioned crystal transition of β -crystal is used, it was impossible to make the productivity in the film formation process and the receiving sheet production process for thermal transfer recording compatible with the sensitivity of the receiving sheet in a high level.

Kindly replace paragraph [0007] with the following:

That is, the void-containing film or white film obtained according to ~~the patent references 1 to 8~~ (for example, Japanese Patent No. 2599934, Japanese Patent No. 1748101, Japanese Patent Laid Open No. Hei 11-343357, Japanese Patent No. 2611392, Japanese Patent No. 2917331, Japanese Patent No. 2964608, Japanese Patent No. 2735989 and Japanese Patent No. 2651469) had the fatal fault as indicated below.

Kindly replace paragraph [0011] with the following:

Moreover, the micro-porous film obtained according to ~~the patent references 9 to 13~~ Japanese Patent No. 1974511, Japanese Patent No. 3443934, Japanese Patent No. 2509030, International Publication WO 02/66233 and Japanese Patent No. 3523404 has a pore penetrated from front to reverse side, namely, it has permeability, and probably by this pore, the surface

smoothness of the film may get worse, or surface glossiness may fall. Therefore, as for the receiving sheet for thermal transfer recording in which these films are used, surface appearance may worsen. Furthermore, receiving layer is made by coating method in many cases, but in the film which has such permeability, the coating material permeated into the inside and it was not able to form a receiving layer well. Moreover, there was a problem that the sum of the strengths of the film at 2% elongation (F2 value) of the longitudinal direction and of the transverse direction of film is too high, and the film is inferior in flexibility to bring about a low crease resistance.

Kindly replace paragraph [0013] with the following:

The white film obtained according to ~~the patent reference 16~~ Japanese Patent Laid Open No. 2004-142321 was, due to the use as the core layer an amorphous resin which is immiscible to polypropylene, big and rough voids were formed like conventional white film, the sensitivity of the receiving sheet for thermal transfer recording in which said film is used for the sub+65-strate was also low.

Kindly replace paragraph [0014] with the following:

~~This invention aims~~ It could therefore be helpful to provide a biaxially oriented white polypropylene film for thermal transfer recording of which productivity in the film formation process is high, which is excellent in processibility in the production process of the receiving sheet for thermal transfer recording, which has non-nucleus voids in the core layer, which is flexible and of low specific gravity, high in whiteness, excellent in crease resistance, film formability and processability, and when it is used as a substrate of a receiving sheet for thermal transfer recording, it shows a sensitivity superior to conventional white film, and to provide a receiving sheet for thermal transfer recording using the biaxially oriented white polypropylene film for thermal transfer recording.

Kindly replace paragraph [0015] with the following:

~~[Means for Solving the Problem]~~ Summary

~~This invention mainly has the following constitutions, in order to solve the above-mentioned problems.~~ We thus provide:

- (1) A biaxially oriented white polypropylene film for thermal transfer recording characterized in that it is a film of polypropylene resin of which β -crystal ratio is 30% or more and melting temperature is 140 to 172°C, which has substantially non-nucleus

voids, a void ratio of 30 to 80% and a sum of strengths of the film at 2% elongation (F2 value) of longitudinal direction and transverse direction being in the range of 10 to 70 MPa and a surface glossiness being in the range of 10 to 145 % (the first configuration).

(2) A biaxially oriented white polypropylene film for thermal transfer recording characterized in that a skin layer (B layer) of which surface glossiness is 10 to 145 % is laminated to at least one side of a core layer (A layer) of polypropylene resin of which β -crystal ratio is 30% or more, melting temperature is 140 to 172°C, which has a substantially non-nucleus void, a void ratio is 30 to 80%, and a sum of the strengths at 2% elongation (F2 value) of longitudinal direction and transverse direction being in the range of 10 to 70 MPa (the second configuration).

(3) A biaxially oriented white polypropylene film for thermal transfer recording in which a skin layer (B layer) of which surface glossiness is in the range of 10 - 145 % is laminated to at least one side of a core layer (A layer) of polypropylene resin of which has substantially non-nucleus voids, characterized in that a sum of strengths at 2% elongation (F2 value) of longitudinal direction and transverse direction of the film is in the range of 30 to 100 MPa and that the film has β -crystal activity (the third configuration).

(4) A biaxially oriented white polypropylene film for thermal transfer recording which is a film in which a skin layer (B layer) having a half-crystallization time of 60 seconds or less and a surface glossiness of 30 to 145 % is laminated at least on one side of a core layer (A layer) which consists of polypropylene resin having substantially non-nucleus voids, characterized in that it is a film of a specific gravity of 0.3 to 0.7 and has β -crystal activity (the fourth configuration).

Kindly replace paragraph [0016] with the following:

In addition, ~~we provide this invention is characterized in~~ a receiving sheet for thermal transfer recording in which a receiving layer is provided on at least one side of said white film, or in providing an anchor layer between the receiving layer and the film in said receiving sheet for thermal transfer recording, or in that said anchor layer consists of at least one or more kinds of resin selected from acryl based resin, polyester based resin, and polyurethane based resin.

Kindly replace paragraph [0017] with the following:

[Effect of the Invention]

~~According to this invention,~~ as As explained below, a biaxially oriented white polypropylene film excellent as a substrate of a receiving sheet for thermal transfer recording and excellent in productivity, and a receiving sheet for thermal transfer recording using the same, can be provided.

- (1) The white film ~~of this invention~~ has many substantially non-nucleus voids, is low in specific gravity, is high in whiteness, optical density and cushion factor, and by making its surface glossiness into a specific range, the sensitivity of the receiving sheet becomes high, and images are printed clearly when it is used for a receiving sheet for thermal transfer recording.
- (2) The white film ~~of this invention~~, because the crystallization speed of the skin layer is high, does not stick or does not cause defect even in high speed and high temperature casting condition. From the above point, it excels in productivity.
- (3) The white film ~~of this invention~~ exhibits a good flexibility and slipperiness and is more excellent in crease resistance compared to conventional white film. From the above point, it excels in processibility.
- (4) Because the white film ~~of this invention~~ is substantially non-nucleus, a void formation agent does not fall out in film formation process and in receiving sheet production process. From the above point, its productivity is excellent.
- (5) By making melting temperature and the sum of the strengths at 2% elongation (F2 value) of longitudinal direction and transverse direction of the film into a proper range, the white film ~~of this invention~~ exhibits an excellent dimensional stability, and the receiving sheet for thermal transfer recording using this film as a substrate also exhibits an excellent dimensional stability.

Kindly replace paragraph [0019] with the following:

[Fig. 2] is an electron photomicrograph (SEM) magnified at 800 times of a cross section of a our biaxially oriented white polypropylene film for thermal transfer recording ~~of this invention~~ (white film ~~of this invention~~ having no nuclei).

Kindly replace paragraph [0022] with the following:

[Fig. 5] is a photograph in which a crater-like defect formed on film surface of a conventional white film other than ~~of this invention~~ is observed.

Kindly replace paragraph [0023] with the following:

~~[Best Mode of Carrying Out the Invention]~~ Detailed Description

Hereafter, the best mode for obtaining the our film ~~of this invention~~, and the biaxially oriented white polypropylene film (hereafter, may simply be abbreviated as “white film”) ~~of this invention~~ are explained taking a case where it is applied to a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0025] with the following:

The A layer (hereafter, may simply be abbreviated as A layer) of the white film of ~~the a~~ first configuration ~~of this invention~~ and the white film of ~~the a~~ second to fourth configuration has substantially non-nucleus voids. Here, “non-nucleus void” means a void which does not have a nucleus (void formation agent) for forming a void by stretching. In such a non-nucleus void, nothing is observed in the void in cross-sectional image at the time of observing the film cross section with a scanning electron microscope (SEM). On the other hand, in so-called “nucleus containing void” which has a nucleus in the void, namely, which is formed by the nucleus (void formation agent), a nucleus of a spherical or fibrous shape, or of an unfixed shape, or of other shapes is observed in the void.

Kindly replace paragraph [0026] with the following:

~~In this invention, what~~ What “has substantially non-nucleus voids”, as mentioned below, is defined as the case where the ratio (percentage) occupied by the void which has a nucleus per all voids is 5 % or less, when a film cross section prepared in specific conditions is observed in specific conditions with a scanning electron microscope (SEM) and total number of voids and nuclei per 1000 μm^2 are counted. Cases other than the above-mentioned are defined as not having the non-nucleus voids. At this time, although a void which originally has a nucleus may also be detected as the non-nucleus void by the above-mentioned method, if the ratio of the void which does not have the nucleus is in the above-mentioned range, ~~the our purpose of this invention~~ will be attained.

Kindly replace paragraph [0027] with the following:

The following five points are raised as an advantage of having substantially non-nucleus voids in a layer of the white film of the first configuration or of the white film of the second to fourth configuration ~~of this invention~~.

- (1) By using an immiscible resin, an inorganic particle or an organic particle as the void formation agent, as compared with the case where it does not have non-nucleus voids, there are few uneven, big and rough voids resulting from poor dispersibility or agglomeration of the void formation agent, uniform and fine voids can be formed.
- (2) Since there are few big and rough voids, it is excellent in crease resistance even as a film of low specific gravity.
- (3) It is possible to prevent such troubles, beforehand, that the void formation agent falls out from film at film formation process or film processing process and soils the processes, or a film breakage occurs thereby.
- (4) The cushion factor of the whole film is high.
- (5) Especially, since the whiteness defined below is high and b value defined below can be made in a low preferable range, when it is used as a receiving sheet for thermal transfer recording, sensitivity can be raised drastically as compared with a film which contains the above mentioned void formation agent and does not have the non-nucleus voids.

Kindly replace paragraph [0028] with the following:

The white film of the first configuration or the A layer of the white film of the second configuration ~~of this invention~~ consists of polypropylene. ~~Here, although~~ Although it means that all the resin that constitutes A layer is polypropylene, as long as the effect ~~of this invention~~ is maintained, in the A layer, for example, resins other than polypropylene, additives or the like exemplified below may be included. Hereafter, whole material constituting A layer may be abbreviated simply as whole resin of A layer.

Kindly replace paragraph [0029] with the following:

The A layer of the white film of the first configuration or the white film of the second configuration ~~of this invention~~ consists of polypropylene resin of which β -crystal ratio is 30% or more and melting temperature is 140 to 172°C. More preferably, it is polypropylene resin of which melting temperature is in the range of 150 to 170°C, since film formation ability is

stabilized and coating process of receiving layer is stabilized. If the melting temperature is lower than 140°C, when used as a receiving sheet for thermal transfer recording, the recording paper may contract and curl with the heat at the time of transfer, and it may not be preferable. On the other hand, if it exceeds 172°C, since film breakage occurs frequently at biaxial stretching to thereby worsen film formation ability, or the sum of strengths of the film at 2% elongation (hereafter, abbreviated as F2 value) of longitudinal direction (hereafter, abbreviated as MD) and transverse direction (hereafter, abbreviated as TD) exceeds 70 MPa, to thereby get flexibility worse or to thereby get crease resistance worse, and it may not be preferable.

Kindly replace paragraph [0033] with the following:

Here, as As for the characteristic values (II, MFR, etc.) of the above-mentioned polypropylene resin, it is preferable to determine using the raw material chip before film production, but the characteristic values measured using the film can also be used.

Kindly replace paragraph [0034] with the following:

To the polypropylene resin of the white film of the first configuration and of the white film of the second to fourth configurations ~~of this invention~~, in the range which does not spoil the purpose ~~of this invention~~, for example, well-known additives, such as an anti-oxidant, a thermostabilizer, a chlorine scavenger, an antistatic agent, a lubricant, an antiblocking agent, a viscosity controlling agent, and copper inhibitor, may be mixed.

Kindly replace paragraph [0035] with the following:

In addition, in the white film of the first configuration, and in the A layer of the polypropylene resin of the white film of the second to fourth configuration ~~of this invention~~, by mixing high melt strength polypropylene (High Melt Strength-PP, hereafter, abbreviated as HMS-PP), melt extrusion is stabilized to thereby improve film formability, and a stable subsequential biaxial stretching at high draw ratio becomes possible. Accompanying this, void ratio increases and it is preferable.

Kindly replace paragraph [0040] with the following:

In addition, since the stretching stress at the time of stretching (in case of manufacturing the white film ~~of this invention~~ by sequential biaxial stretching, especially, at the time of longitudinal stretching) may be reduced to thereby make it possible to manufacture within a capacity of stretching torque of existing facility or since the void formation accompanying stretching may be accelerated, at least one kind selected from other type polymers other than the

above-mentioned polypropylene resin and the elastomer component may be added to the white film ~~of this invention~~, if necessary. However, of course, the white film ~~of this invention~~ should have the above-mentioned non-nucleus voids, but it may be more preferable not to add these other type polymer, when the drawing stress is not improved at the time of film formation, or on the contrary, when it becomes higher than necessary level, or when a void configuration becomes not uniform by forming a big and rough void. As these other type polymers, vinyl polymer resin which includes well-known polyolefin based resin, polyester based resin, polyamide based resin, polyphenylene sulfide based resin, polyimide based resin, etc., are mentioned.

Kindly replace paragraph [0041] with the following:

The β -crystal ratio of the polypropylene resin of the A layer of the white film of the first configuration and of the white film of the second configuration ~~of this invention~~ needs to be 30% or more. If the β -crystal ratio is under the above-mentioned, the amount of void formation is insufficient and uniform voids in thickness direction of film may be hard to be obtained. Moreover, the higher the β -crystal ratio of the A layer of the white film ~~of this invention~~, the better accelerated the void formation described above. Therefore, since a high sensitivity can be obtained when it is processed into a receiving sheet for thermal transfer recording, an upper limit is not especially proposed in the above-mentioned β -crystal ratio, but when it is too high, since crease resistance may get worse although it improves sensitivity, it is preferable in view of sensitivity compatible with the crease resistance to be 95 % or less for example. The β -crystal ratio in the A layer is more preferably 40 to 95%, and still more preferably 45 to 90 %.

Kindly replace paragraph [0042] with the following:

Moreover, the white film of the third and fourth configurations ~~of this invention~~ contains non-nucleus voids in the A layer and therefore needs to have β -crystal activity. By this β -crystal activity, β -crystal is generated in an undrawn sheet in the film formation process, and the β -crystal changes to α -crystal at successive stretching process. It enables ~~to the form~~ the form formation of uniform and fine voids.

Kindly replace paragraph [0043] with the following:

~~Here, in this invention, considering~~ Considering that the whole white film ~~of this invention~~ has β -crystal activity, it is determined that the A layer has β -crystal activity by the following criteria. That is, using a differential scanning calorimeter (DSC), a 5 mg white film is heated to 280°C at a rate of 10°C/min under nitrogen-gas-atmosphere according to JIS K 7122

(1987), after keeping for 5 minutes, it is cooled down to 30°C at a rate of 10°C/min, then after keeping for 5 minutes, then a calorimetric curve was obtained when a temperature is elevated again at a rate for 10°C/min (hereafter, may be abbreviated as calorimetric curve of second run). If an endothermic peak exists between 140°C and 160°C of the calorimetric curve and if the heat of fusion determined by the peak area of the endothermic peak is 10 mJ/mg or more, it is defined that the white film has β -crystal activity (as the whole film). On the other hand, although an endothermic peak exists in the above-mentioned temperature range and if it is unclear whether the peak is originated from the β -crystal activity or not, you may judge that "it has the β -crystal activity" by combining the result of DSC with, using wide angle X-ray diffraction method, an existence of diffraction peak in the field (300) observed near $2\theta = 16^\circ$ which originates from β -crystal, for the sample which carried out melt crystallization of said sample under the following specified conditions mentioned below.

Kindly replace paragraph [0044] with the following:

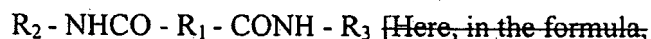
In order ~~To~~ to keep β -crystal ratio of 30% or more of the polypropylene resin of the white film of the first and second configuration ~~of this invention~~, or to have β -crystal activity of the white film of the third or fourth configuration ~~of this invention~~, it is preferable to add so-called β -crystal nucleating agent to the above-mentioned polypropylene resin. When such β -crystal nucleating agent is not added, the above high β -crystal ratio may not be obtained. As the β -crystal nucleating agent which can be preferably added to the polypropylene resin which constitutes the white film ~~of this invention~~, for example, alkali or alkaline earth metal salt of carboxylic acid represented by such as potassium 1,2-hydroxy stearate, magnesium benzoate, magnesium succinate, magnesium phthalate; amide based compound represented by such as N,N'-dicyclohexyl-2,6-naphthalene dicarboxamide; aromatic sulfonic-acid compound represented by such as sodium benzenesulfonate, sodium naphthalene sulfonate; di- or tri-esters of di- or tri- carboxylic acid; tetraoxaspiro compounds; imide carboxylic-acid derivatives; phthalocyanine based pigment represented by such as phthalocyanine blue; quinacridone based pigment represented by such as quinacridone, quinacridone quinone; two-component based compound which consists of component A which is an organic dibasic acid and component B which is an oxide, hydroxide or salt of the IIA group metal of the periodic table, etc., are mentioned. However, it is not necessarily limited to these, and only one kind may be used, or two or more kinds may be mixed and used. As the β -crystal nucleating agent added to the

polypropylene resin which constitutes the A layer of the white film of the first and second to fourth configurations of this invention, among the above mentioned, the following compounds 1 and 2 are especially preferable since they can make the β -crystal ratio of undrawn sheet high and can accelerate the formation of void at subsequent stretching process.

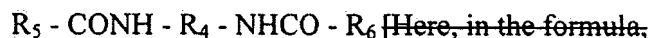
Kindly replace paragraphs [0045], [0046] and [0047] with the following:

[Compound 1]

Amide based compound represented by such as N,N'-dicyclohexyl-2,6-naphthalene dicarboxamide expressed by the following chemical formula



wherein R_1 denotes a saturated or unsaturated aliphatic dicarboxylic acid residue having 1 to 24 carbon atoms, a saturated or unsaturated alicyclic dicarboxylic acid residue having 4 to 28 carbon atoms or an aromatic dicarboxylic acid residue having 6 to 28 carbon atoms, and R_2 and R_3 are same or different cyclo alkyl groups having 3 to 18 carbon atoms or cyclo alkenyl groups having 3 to 12 carbon atoms, or derivative2 thereof.}



wherein R_4 denotes a saturated or unsaturated aliphatic diamine residue having 1 to 24 carbon atoms, a saturated or unsaturated alicyclic diamine residue having 4 to 28 carbon atoms, a heterocyclic diamine residue having 6 to 12 carbon atoms or an aromatic diamine residue having 6 to 28 carbon atoms, and R_5 and R_6 are same or different cyclo alkyl groups having 3 to 12 carbon atoms or cyclo alkenyl groups having 3 to 12 carbon atoms, or derivatives thereof.}

Kindly replace paragraph [0050] with the following:

Regarding the amount to be added of the β -crystal nucleating agent ~~of this invention~~, although it depends on the β -crystal generation ability of the β -crystal nucleating agent to be used, it is preferable to be 0.001 - 1 % by weight to the whole quantity of the whole resin of the A layer. If the amount to be added of the β -crystal nucleating agent is under the above-mentioned range, the β -crystal ratio of the white film obtained becomes insufficient or the specific gravity becomes high or a big and rough void is formed, and the sensitivity may be inferior when it is processed into a receiving sheet for thermal transfer recording. If the added the amount of β -crystal nucleating agent exceeds the above-mentioned range, β -crystal ratio of the white film obtained may not be improved even if it is added more, but the economical efficiency becomes inferior, the dispersibility of the nucleating agent itself may get worse and β -

crystal ratio may fall on the contrary. The amount to be added of β -crystal nucleating agent is, more preferably, 0.005 to 0.5 % by weight, still more preferably, 0.05 to 0.2 % by weight.

Kindly replace paragraph [0052] with the following:

Moreover, the sum of the strengths at 2% elongation (F2 value) of longitudinal direction (hereafter, may be abbreviated as MD) and transverse direction (hereafter, may be abbreviated as TD) of the white film of the first configuration and of the A layer of the white film of the second configuration ~~of this invention~~ is in the range of 10 to 70 MPa. The F2 value of the white film of ~~this invention~~ can be controlled by the added the amount of the β -crystal nucleating agent which is preferably added to polypropylene resin, by the ratio of the thickness of the core layer (A layer) and the skin layer (B layer), and in its production process, by the crystallization conditions (metal drum temperature, rotating speed of metal drum and thickness of undrawn sheet obtained) at the time of solidifying the molten polymer in casting process, by stretching conditions (stretching direction (longitudinal or transverse), by stretching method (longitudinal-transverse or transverse-longitudinal sequential biaxial stretching, simultaneous biaxial stretching, re-stretching after biaxial stretching, etc.) in stretching process, stretching ratio, stretching speed, stretching temperature, etc.), or by heat treating condition, etc. If sum of F2 value of MD and TD is less than 10 MPa, the film is too soft and stretched at winding in the film formation process to thereby cause creases in the film. On the other hand, if F2 value exceeds 70 MPa, the film is damaged at winding after film formation process and crease resistance may become low.

Kindly replace paragraph [0053] with the following:

Next, in the white film of the second to fourth configurations ~~of this invention~~, the polypropylene resin layer having the above-mentioned substantially non-nucleus voids is used as the core (A layer), and the skin (B layer) (hereafter, may simply be abbreviated as B layer) is laminated to at least one side of the core. Thereby, as compared with the case where the laminating of B layer is not carried out, surface smoothness and glossiness of film can be improved. Furthermore, in case a receiving layer is formed on the B layer to be processed into a receiving sheet for thermal transfer recording, as compared with the case where the lamination of B layer is not carried out, close contact with thermal head is improved and heat loss is prevented to thereby improve transferring ability from ink ribbon, i.e., sensitivity.

Kindly replace paragraph [0054] with the following:

As for the B layer of the white film of the second and third configuration ~~of this invention~~, it is preferable to consist of at least one or more kinds of resin from polyolefin based resin, acryl based resin, polyester based resin, polyurethane based resin, etc., and polyolefin based resin is especially preferable, and more preferably it is polypropylene resin. As polyolefin resin which can make the adhesion with the A layer and/or glossiness high, for example, homopolypropylene or a random or block copolymer of propylene with ethylene or α -olefins such as butene, hexene or octene, etc., are mentioned. Among them, homopolypropylene is preferable since it makes thermal resistance of B layer surface high.

Kindly replace paragraph [0055] with the following:

As polypropylene resin of the B layer of the white film of the second and third configuration ~~of this invention~~, crystalline polypropylene having II of 92% or more is preferable. To this polypropylene resin, it is possible to add 1 to 10% by weight of poly methyl pentene, isotactic polystyrene, syndiotactic polystyrene, polymethyl methacrylate, polycarbonate, etc. as the immiscible resin component. By this addition, fine voids are formed in the B layer and it may be possible to increase sensitivity as the receiving sheet. If the added the amount is less than 1% by weight, a void is hard to be formed, and if it is more than 10% by weight, since the immiscible resin may fall out at film formation process and at a further processing process, it is not preferable.

Kindly replace paragraph [0059] with the following:

Moreover, as for the B layer of the white film of the second and third configurations ~~of this invention~~, the following resin is preferably used as the resin other than the above-mentioned polypropylene resin. As the acryl based resin, for example, ethylene-acrylic acid copolymer, ethylene-acrylic acid ester copolymer, ethylene-methacrylic acid copolymer, ethylene-methacrylic acid ester copolymer, etc. can be mentioned. As the polyester based resin, aromatic polyester is preferable and, as polyurethane based resin, polyether urethane or polyester urethane of ionomer type is preferable.

Kindly replace paragraph [0079] with the following:

Moreover, ~~in order~~ to impart slipperiness to the B layer of the white film of the second and third configurations ~~of this invention~~, it is preferable to add at least one kind or more of a small amount of inorganic or organic particles. However, it is preferable that the amount to be

added at this time is 0.01 to 1% by weight, and more preferably, it is 0.1 to 0.5% by weight. If it exceeds 1% by weight, said resin or particles may fall out in the film formation process or in the production process of the receiving sheet for thermal transfer recording, thus it is not preferable. In case of that the added amount is less than 0.01% by weight, the effect of imparting slipperiness is not attained.

Kindly replace paragraph [0083] with the following:

It is necessary that the sum of the strengths at 2% elongation (F2 value) of longitudinal direction (MD) and transverse direction (TD) of the white film of the third configuration ~~of this invention~~ is in the range of 30 to 100 MPa. The F2 value of the whole film becomes high by laminating the B layer to at least one side of the above-mentioned A layer, preferably laminating to both sides. The F2 value can be controlled by the amount to be added of the β -crystal nucleating agent which is preferably added to polypropylene resin, the ratio of thickness of the A layer and the skin layer (B layer), and in its production process, by the crystallization conditions at the time of solidifying the molten polymer in casting process, by the stretching conditions in stretching process (stretch ratio, stretching speed, stretching temperature, etc.), or by heat treatment conditions, etc. By being the sum of the F2 value of MD and TD in the range of 30 to 100 MPa, crease resistance is improved further and elongation of film by the tension in winding process at film formation or by the tension at production process of receiving sheet for thermal transfer recording is prevented to thereby improve processability.

Kindly replace paragraph [0084] with the following:

Regarding the white film of the fourth configuration ~~of this invention~~, to at least one side of the above-mentioned A layer, it is necessary to laminate a B layer having a half crystallization time ($t_{1/2}$) of 60 seconds or less.

Kindly replace paragraph [0085] with the following:

Here, $t_{1/2}$ is defined as the time from the starting time to the time of the highest point of the endothermic peak accompanying crystallization, when, using DSC, a sample is cooled from a molten stage and the time when the temperature arrives at a specified temperature (125°C) is set as a starting time (=0), and the sample is kept at said specified temperature.

Kindly replace paragraph [0086] with the following:

If the $t_{1/2}$ of the B layer of the white film of the fourth configuration ~~of this invention~~ is made less than 60 seconds, and preferably, the B layer is the metal drum side at producing an undrawn sheet, there are the following advantages.

- (1) Even if the drum temperature is made high in order to increase the β -crystal ratio of the undrawn sheet, many voids can be formed in the film without generating crater-like defect after biaxial stretching on surface of the white film.
- (2) Even if retention time of the undrawn sheet is shortened by increasing rotating speed of the drum, productivity can be improved because the film is unlikely to stick to the drum.

Kindly replace paragraph [0088] with the following:

The B layer of the white film of the fourth configuration ~~of this invention~~ consists of polypropylene resin. ~~Here, what~~ That the B layer ~~consist~~ consists of polypropylene resin means that the whole resin constituting the B layer is polypropylene resin, but as long as the effect of ~~this invention~~ is maintained, in the B layer, for example, a resin, additive, particle or the like other than polypropylene which is mentioned below may be included. In any event, the above-mentioned $t_{1/2}$ is the value measured for the polypropylene in the state including these whole material constituting the B layer (hereunder, may be abbreviated simply as the whole resin of B layer).

Kindly replace paragraph [0089] with the following:

Although it is preferable that the polypropylene resin constituting the B layer mainly consists of homopolymers of propylene, as long as the purpose ~~of this invention~~ is not ~~impaired~~ impaired, it may be a polymer in which propylene and other monomer component of unsaturated hydrocarbon are copolymerized, or a polymer in which propylene and monomer component other than propylene is copolymerized may be blended, or a (co)polymer of monomer component of unsaturated hydrocarbon other than propylene may be blended. As these copolymerizing component or monomer component constituting blended product, for example, ethylene, propylene (in case of copolymerized blended product), 1-butene, 1-pentene, 3-methyl pentene-1, 3-methylbutene-1, 1-hexene, 4-methyl pentene-1, 5-ethyl hexene-1, 1-octene, 1-decene, ~~1-dodecene~~ 1-dodecene, vinyl cyclohexene, styrene, allyl benzene, cyclopentene, norbornene, 5-methyl-2-norbornene, acrylic acid and derivatives thereof, are mentioned. Among

these, as polypropylene resin constituting the B layer, homopolypropylene or ethylene-propylene random copolymer in which less than 5 % by weight of ethylene copolymerized is preferable in view of film formability and adhesion (in case of processing into a receiving sheet for thermal transfer recording by providing a receiving layer or an anchor layer on the B layer) to receiving layer (or anchor layer), but it is not limited thereto.

Kindly replace paragraph [0091] with the following:

Here, As as the α -crystal nucleating agent, sorbitol based nucleating agent, metal organic phosphate based nucleating agent, metal organic carboxylate based nucleating agent, rosin based nucleating agent, etc., are mentioned. Among them, rosin based nucleating agent is especially preferable in view of high effect of improving product quality and productivity by crystallization acceleration. As examples of these especially preferable rosin based nucleating agent, "PINECRYSTAL" produced by Arakawa Chemical Ind. Ltd. (type name: KM-1300, KM-1500, KM-1600, etc.), etc., are mentioned.

Kindly replace paragraph [0092] with the following:

As the β -crystal nucleating agent, same nucleating agent as shown in the first to third configurations ~~of this invention~~ can be used.

Kindly replace paragraph [0095] with the following:

For the B layer of the white film of the fourth configuration ~~of this invention~~, it is preferable to use the above-mentioned HMS-PP. Since melt extrusion stabilizing effect and the above-mentioned improving effect on product quality and productivity by acceleration of crystallization are significant, it is especially preferable to use a polypropylene having a long-chain branch in its main chain.

Kindly replace paragraph [0097] with the following:

It is preferable that the crystallization temperature (T_c) of the B layer of the white film of the fourth configuration ~~of this invention~~ is 115°C or more. Here, T_c is, similar to that of $t_{1/2}$, a value measured for the whole resin of the B layer. If T_c of the B layer is less than the above-mentioned range, in casting process, when a molten polymer is solidified on a metal drum maintained at a high temperature higher than 100°C, especially when rotating speed of the drum is high, the solidification is not finished before leaving the sheet from the drum, and the undrawn sheet may stick to the drum. T_c is, more preferably, 119°C or more. In addition, the higher the T_c of the B layer, adhesion or defect is more unlikely to be generated even by high

temperature-high speed casting, and a white film having a similar quality as in a case of low temperature-low rotating speed may be obtained. An upper limit is not determined especially, but if it is too high, since co-drawability with the A layer may worsen or adhesion to the receiving layer (or anchor layer) may worsen when it is processed to a receiving sheet for thermal transfer recording by providing a receiving layer on the B layer, for example, it is preferable to be 150°C or lower. The T_c of the B layer can be controlled by crystallinity of polypropylene (II, etc.), by amounts to be added of the above exemplified crystal nucleating agent or HMS-PP, or by amount to be added of the immiscible resin, inorganic particle, organic particle, etc. exemplified below. The T_c of the B layer is, more preferably, 120 to 145°C, most preferably, 123 to 130°C.

Kindly replace paragraph [0098] with the following:

It is preferable that the isotactic index (II) of the polypropylene constituting the B layer of the white film of the fourth configuration ~~of this invention~~ is 95 to 99.8 %. If the II is less than the above-mentioned range, heat resistance against heat from thermal head is inferior when used as a receiving sheet for thermal transfer recording by providing a receiving layer on the B layer, and sensitivity becomes low depending on transferring energy. If the II exceeds the above-mentioned range, in production process of white film, a breakage is generated and drawability may become inferior. The II of the polypropylene resin constituting the B layer is, more preferably, 97 to 99.5 %.

Kindly replace paragraph [0099] with the following:

The void ratio of the B layer of the white film of the fourth configuration ~~of this invention~~ is preferably 0.1 to 5 %. ~~Here, the~~ The void ratio of the B layer is, as mentioned below, the ratio occupied by void in skin layer when the cross-section of a film prepared in a specified condition is observed by SEM under a specified condition. If the void ratio is less than the above-mentioned range, sensitivity at low energy may decrease when used as a receiving sheet for thermal transfer recording by providing a receiving layer on the B layer, or, for this reason, high speed printing ability may become inferior. If the void ratio of the B layer exceeds the above-mentioned range, B layer surface of the white film becomes easy to be broken in layers (skilled in the art says this phenomena as becoming easy to be cleaved), and apparent adhesion with receiving layer (or anchor layer) may worsen when processed into a receiving

sheet for thermal transfer recording by providing a receiving layer on the B layer. The void ratio of the B layer is, more preferably, 0.2 to 3 %, still more preferably, 0.2 to 2 %.

Kindly replace paragraph [0100] with the following:

~~In order to~~ To form a void of the above-mentioned configuration in the B layer, in its production process, it is important to adjust the surface temperature of the metal drum of the undrawn sheet production process, for example, at a high temperature of 100 to 130°C. However, ~~in order~~ to accelerate the void formation, the immiscible resin, inorganic particle, organic particle, etc. mentioned below, may be added to the polypropylene which constitutes the B layer. ~~Here, these~~ These additions, not only accelerate void formation, of course, but also may be effective for improving slipperiness by forming fine protrusion on the film surface.

Kindly replace paragraph [0101] with the following:

As the above-mentioned immiscible resin which can preferably be added to the B layer, although not limited thereto, the resin immiscible to the polypropylene resin which can be added to the B layer of the white film disclosed in the second and third configurations ~~of this invention~~ can similarly be used.

Kindly replace paragraph [0102] with the following:

As the immiscible resin used in the B layer of the white film of the fourth configuration ~~of this invention~~, in view of its handling, production cost (price of raw material), dispersibility in polypropylene and void formation, it is especially preferable to use publicly known polymethylpentene, polycarbonate, saturated polyester, etc.

Kindly replace paragraph [0106] with the following:

The amount of the immiscible resin to be added to the B layer of the white film of the fourth configuration ~~of this invention~~ is preferably 1 to 10 % by weight per total amount of the whole resin of the B layer. If the added amount of the immiscible resin is less than the above-mentioned range, substantial amount of void may not be formed. If the added amount of the immiscible resin exceeds the above-mentioned range, more than necessary amount of void is formed and the B layer may easily cleave. The amount of the immiscible resin to be added is, preferably, 1 to 8 % by weight, more preferably, 2 to 5 % by weight.

Kindly replace paragraph [0108] with the following:

~~And, as~~ As inorganic particles which can preferably be added to the B layer of the white film of the fourth configuration ~~of this invention~~, although not limited thereto, for example, at

least one type of particles selected from wet and dry silica, colloidal silica, aluminum silicate, titanium oxide, calcium carbonate, calcium phosphate, barium sulfate, alumina, magnesium carbonate, zinc carbonate, titanium oxide, zinc oxide (zinc white), antimony oxide, cerium oxide, zirconium oxide, tin oxide, lanthanum oxide, magnesium oxide, barium carbonate, zinc carbonate, basic lead carbonate (white lead), barium sulfate, calcium sulfate, lead sulfate, zinc sulfide, mica, mica-titanium, talc, clay, kaolin, lithium fluoride, calcium fluoride, etc., are mentioned.

Kindly replace paragraph [0111] with the following:

~~And, these~~ The inorganic particle or organic particle particles, even in a case in which it is not necessary to form a substantial amount of void in the B layer, may be added in order to improve slipperiness of film. In this case, amount to be added is preferably 0.02 to 1 % by weight, in view of preventing blocking, improving slipperiness, etc. More preferably, it is 0.05 to 0.5 % by weight.

Kindly replace paragraph [0113] with the following:

It is preferable that the average particle diameter of the inorganic particle or organic particles to be added to the B layer of the white film of the fourth configuration ~~of this invention~~ is 0.5 to 5 μm . If the average particle diameter is less than the above-mentioned range, a substantial amount of void may not be formed in the B layer, or slipperiness may not be much improved compared to a case without the addition. If the average particle diameter exceeds the above-mentioned range, in the production process of the white film or the receiving sheet for thermal transfer recording, the particle may fall out and film surface will easily get damaged when the film is superposed and rubbed with each other. The average diameter of the inorganic particle or the organic particle is, more preferably, 0.8 to 3 μm .

Kindly replace paragraph [0115] with the following:

Thickness of the B layer of the white film of the second to fourth configurations ~~of this invention~~ is in the range of 0.1 to 5 μm , and it is preferable to be laminated to both sides of the A layer, because driving property in the film formation process and the production process of a receiving sheet for thermal transfer recording is good and a cleavage can be prevented. If the thickness of the B layer is less than the above-mentioned range, it may become difficult to laminate in uniform thickness or worsen crease resistance. If the thickness of the B layer exceeds the above-mentioned range, sensitivity may worsen when it is processed to a receiving

sheet for thermal transfer recording by providing a receiving layer on the B layer. The thickness of the B layer is, preferably, 0.5 to 4 μm , more preferably, 1 to 4 μm .

Kindly replace paragraph [0116] with the following:

In addition, it is necessary that the surface glossiness of the white film of the first configuration ~~of this invention~~ and the B layer of the white film of the second and third configuration ~~of this invention~~ is 10 to 145%. If the surface glossiness is less than 10 %, when used as a receiving sheet for thermal transfer recording, image or character becomes unclear, and if it exceeds 145 %, image or character becomes hard to read due to reflection, and both are not preferable.

Kindly replace paragraph [0117] with the following:

The surface glossiness of the B layer of the white film of the fourth configuration ~~of this invention~~ is 30 to 145 %.

Kindly replace paragraph [0118] with the following:

~~Here, the~~ The glossiness of the B layer is the value measured on the B layer surface of the white film. If the B layer is laminated on both sides of the A layer, the purpose ~~of this invention~~ is satisfied if any one of the surface glossiness of the B layer meet the above-mentioned range. By making the surface glossiness in the above-mentioned range, when an image is printed on a receiving sheet for thermal transfer recording in which a white film ~~of this invention~~ is used as a substrate, an excellent image visibility can be realized without making image and character unclear and without reflecting light on the receiving sheet which makes image and character hard to read. The surface glossiness can be controlled by crystallinity (II or mmmm, etc.) or raw material composition of polypropylene resin constituting of the B layer to be evaluated, crystallization condition at solidification of molten polymer at casting process or stretching condition at stretching process, etc. Among these, especially when β -crystal nucleating agent is added to the B layer, since, as mentioned above, a void which penetrates through both sides (so-called penetrated hole) in the white film obtained may be formed and surface glossiness may fall, its selection needs carefulness. The surface glossiness of the B layer, more preferably, 70 to 130 %, still more preferably, 85 to 128 %.

Kindly replace paragraph [0119] with the following:

Average surface roughness (Ra) of the white film of the first configuration ~~of this invention~~ and of the B layer of the white film of the second and third configuration ~~of this invention~~

~~invention~~ is, preferably, in the range of 0.02 to 1 μm . Average surface roughness (Ra) of the B layer of the white film of the fourth configuration ~~of this invention~~ is, being smoothened by speed up of $t_{1/2}$, preferably 0.01 to 0.5 μm . If Ra is less than the above-mentioned range, slipperiness of the white film worsens and creases may be formed in the white film or in the receiving sheet in the production process of the film or the receiving sheet for thermal transfer recording. If Ra exceeds 1 μm , surface glossiness unnecessarily decreases, or the white film or the receiving sheet may be damaged when passed on metal drum at winding process during white film formation or at processing process in the production process of the receiving sheet for thermal transfer recording. The average roughness (Ra) can be controlled by crystallinity (II or mmmm, etc.) of the polypropylene (or polypropylene based resin) used for the B layer or crystallization condition at solidification of molten polymer in casting process (metal drum temperature, rotating speed of metal drum and thickness of undrawn sheet obtained) or by the stretching conditions in stretching process (stretching direction (longitudinal or transverse), by stretching method (longitudinal-transverse or transverse-longitudinal sequential biaxial stretching, simultaneous biaxial stretching, re-stretching after biaxial stretching, etc.), or by draw ratio, stretching speed, stretching temperature, etc.)etc. Ra is, more preferably, 0.05 to 0.50 μm , still more preferably, 0.15 to 0.45 μm .

Kindly replace paragraph [0120] with the following:

To the white film of the second to fourth configuration ~~of this invention~~, other layer (hereafter, may be abbreviated simply as C layer) other than the above-mentioned B layer may be laminated as a skin layer. When the C layer is laminated and a three layer laminate is formed, its film constitution becomes B layer/A layer/C layer (/ denotes interface). When the white film of this constitution is processed to a receiving sheet for thermal transfer recording, the receiving layer (anchor layer) may be provided on the B layer or on the C layer, but it is especially preferable that, in the white film production process, at the time of undrawn sheet production, a high speed film formation is carried out by making B layer side closely contact with metal drum, and at production process of the receiving sheet for thermal transfer recording, the receiving layer is provided on the C layer which is provided on the reverse side of the B layer. By this way, the white film can be produced at high speed and, at the same time, the adhesion strength of the receiving layer can be improved by properly selecting C layer.

Kindly replace paragraph [0123] with the following:

In the case where a receiving layer (anchor layer) is provided on the C layer, among them, it is especially preferable to use polypropylene of low stereoregularity or ethylene-propylene random copolymer for compatibility between the co-drawability with the A layer and the adhesion to the receiving layer (anchor layer).

Kindly replace paragraph [0124] with the following:

The stereoregularity (mmmm) of the above-mentioned low stereoregular polypropylene is preferably 70 to 90 % in view of adhesion to the receiving layer (anchor layer). If mmmm is less than the above-mentioned range, when used as a receiving sheet for thermal transfer recording by forming a receiving layer (anchor layer) on the B layer, thermal resistance against heat from thermal head may be inferior and sensitivity may worsen depending on transfer energy. If mmmm exceeds the above-mentioned range, adhesion strength to the receiving layer (anchor layer) may substantially not increase. mmmm is more preferably 72 to 85 %. ~~Here,~~ ethylene ~~Ethylene~~ may be copolymerized to the low stereoregular polypropylene, since the adhesion strength to the receiving layer (anchor layer) may further be improved.

Kindly replace paragraph [0128] with the following:

In the A layer, B layer and C layer, of the white film of the fourth configuration ~~of this invention~~, publicly known additives other than the above-mentioned, for example, antioxidant, thermal stabilizer, antistatic agent, lubricant, anti-blocking agent, filler, etc. may be included to such an extent that the purpose of this invention is not impaired.

Kindly replace paragraph [0129] with the following:

Specific gravity of the white film of the first to third configuration ~~of this invention~~ is preferably 0.2 to 0.8. ~~And, specific~~ Specific gravity of the white film of the fourth configuration ~~of this invention~~ is 0.3 to 0.7. By controlling the specific gravity in this range, sensitivity is high when processed into a receiving sheet for thermal transfer recording, and mechanical strength is moderately high, and windability and processability is excellent in the production process of the white film and the receiving sheet for thermal transfer recording. The specific gravity of the white film ~~of this invention~~ can be controlled by the amount of β -crystal nucleating agent preferably added to polypropylene resin or by the ratio of thicknesses of A layer, B layer and C layer, and in its production process, by the crystallizing condition at solidifying molten polymer in casting process, by stretching condition in stretching process, or by heat treating condition,

etc. Among these, in the casting process, it is especially important to uniformly generate dense β -crystals in the white film of the first configuration and in the A layer of the white film of the second to fourth configuration and, in the stretching process, areal ratio, especially longitudinal draw ratio, etc. The lower the specific gravity of the white film ~~of this invention~~, the higher the sensitivity may be when processed into a receiving sheet for thermal transfer recording, and it is preferable. However, if it is too low, in the production process of the white film or the receiving sheet for thermal transfer recording, the film may be elongated, or ~~crease~~ crease may be generated, or the film may be broken (~~skilled in the art says~~, when these phenomena are observed, that the film is inferior in processability), or crease resistance may worsen. The specific gravity of the white film ~~of this invention~~ is, more preferably, 0.33 to 0.69, still more preferably, 0.35 to 0.65, most preferably, 0.35 to 0.62.

Kindly replace paragraph [0130] with the following:

In addition, it is preferable that thermal conductivity of the white film of the first to third configuration ~~of this invention~~ is less than 0.14 W/mK, and preferably less than 0.12 W/mK, in view of increasing sensitivity of the receiving sheet for thermal transfer recording. If the thermal conductivity exceeds 0.14 W/mK, the heat of thermal head of printer diffuses and transferring ability from printer ribbon decreases to thereby decrease sensitivity (color development property) of receiving sheet for thermal transfer recording, and it is not preferable. It is preferable that the lower limit of the thermal conductivity is 0.03 W/mK in view of the thickness constitution of A layer and B layers, void ratio and total thickness of the biaxially oriented white polypropylene film ~~of this invention~~.

Kindly replace paragraph [0131] with the following:

It is preferable that the white film of first to fourth configurations ~~of this invention~~ has a whiteness of more than 50 %, an L value of more than 50, an a value of -2 to 5 and a b value of -4 to -0.01, in view of increasing sensitivity of receiving sheet for thermal transfer recording.

Kindly replace paragraph [0134] with the following:

It is preferable that the whiteness of the white film of the first to forth configuration ~~of this invention~~ is in the range of 50 to 100 %. If the whiteness is less than the above-mentioned range, image may become dark as a whole when the image is printed on the receiving sheet for thermal transfer recording. The whiteness is, more preferably, 60 to 100 %.

Kindly replace paragraph [0135] with the following:

L value of the white film of ~~this invention~~ is preferably more than 50. If the L value is less than the above-mentioned range, image may look unclear when processed into a receiving sheet for thermal transfer recording. L value is, more preferably, 60 to 100. It is preferable that a value of the white film of the first to fourth configurations of this invention is -2 to 5. If a value is higher than the above-mentioned range in + side, image may look reddish as a whole when the image is printed on the receiving sheet for thermal transfer recording. If a value is lower than the above-mentioned range in the "minus" side, image may look greenish. a value is, more preferably, -0.02 to 3, still more preferably -0.02 to 1.

Kindly replace paragraph [0136] with the following:

b value of the white film of the first to fourth configurations of ~~this invention~~ is preferably -5 to -0.01. If b value is higher than the above-mentioned range in + side, an image may look yellowish as a whole, when the image is printed on a receiving sheet for thermal transfer recording, especially tint color such as flesh color may look yellowish. If b value is lower than the above-mentioned range in - side, image may look bluish. b value is, more preferably, -4.5 to -2.7.

Kindly replace paragraph [0137] with the following:

It is preferable that the optical density (OD) of the white film of the first to fourth configurations of ~~this invention~~ is 0.4 to 1. If OD is less than the above-mentioned range, an image impression may be dark when the image is printed on the receiving sheet for thermal transfer recording. OD changes depending on thickness of film, and in this invention, if it is in the above-mentioned range at film thickness of 35 μm , the whiteness and L, a, b values of film can probably be made into the preferable range. OD of the white film of this invention is, more preferably, 0.65 to 0.82.

Kindly replace paragraph [0138] with the following:

The whiteness, L, a, b values and OD of the white film of the first to fourth configurations of ~~this invention~~ can be controlled by the amount of β -crystal nucleating agent which is preferably added to polypropylene resin, by the ratio of thicknesses of A layer and skin layer (B layer and C layer), and, in its production process, by the crystallization condition at

solidifying the molten polymer in casting process or by stretching condition at stretching process, etc.

Kindly replace paragraph [0139] with the following:

It is preferable that the cushion factor of the white film of the wing: first to fourth configurations ~~of this invention~~ is 15 to 30 %. If the cushion factor is less than the above-mentioned range, a receiving sheet for thermal transfer recording becomes hard to closely contact with thermal head to thereby diffuse heat from the thermal head and may worsen transfer ability (sensitivity falls) from transfer sheet (ink ribbon). If the cushion factor exceeds the above-mentioned range, crease resistance of receiving sheet for thermal transfer recording may worsen. The cushion factor can be controlled by the amount of β -crystal nucleating agent preferably added to polypropylene resin of A layer, by the ratio of thicknesses of A layer and skin layer (B layer and C layer), by the crystallinity of polypropylenes (or polypropylene based resins) used in A layer, B layer and C layer, and, in its production process, by the crystallization condition at solidifying the molten polymer in casting process or by stretching condition at stretching process, etc. The cushion factor is, more preferably, 16 to 25 %.

Kindly replace paragraph [0140] with the following:

It is preferable that the thickness of the white film of the first to fourth configurations ~~of this invention~~ is 10 to 100 μ m, in view of productivity of the white film, and sensitivity and crease resistance of the receiving sheet for thermal transfer recording. The thickness of the white film of this invention is, more preferably, 20 to 60 μ m.

Kindly replace paragraph [0141] with the following:

It can preferably be applied that at least one surface of the white film of the first to fourth configurations ~~of this invention~~ is subjected to corona discharge treatment to thereby make wet tension of the film surface to 35 mN/m or more, in order to increase adhesion strength between the treated surface and a receiving layer (anchor layer) and adhesion strength between the treated surface and other material exemplified below. In this instance, as atmospheric gas at the corona discharge treatment, at least one type of gas selected from air, oxygen, nitrogen, carbon dioxide, etc., are mentioned. Among these, it is preferable to use air in view of economics and it is preferable to use nitrogen/carbon dioxide mixture system, in view of the above-mentioned adhesion improvement. The surface wet tension is, more preferably, 37 mN/m or more. Upper limit of the surface wet tension is not determined especially, but an excess surface treatment may

deteriorate the surface and the above-mentioned adhesion strength may worsen on the contrary, therefore, 60 mN/m or less is preferable.

Kindly replace paragraph [0142] with the following:

On at least one surface of the white film of the first to fourth configurations ~~of this invention~~, in order to increase adhesion strength between the white film and a receiving layer, an anchor layer may be provided. The constitution of the receiving layer of this case becomes white film/anchor layer/receiving layer. In addition, the anchor layer may be provided on any one of the white film of the first configuration and core layer (A layer; in case of only one side laminated B layer) and skin layer (B layer, C layer) of the white film of the second to fourth configurations, but since adhesion strength can be controlled by suitably selecting resin composition, it is especially preferable to be provided on the skin layer.

Kindly replace paragraph [0147] with the following:

~~And, as~~ As diol component of the polyester urethane based resin, aliphatic glycols such as ethylene glycol, 1,4-butanediol, diethylene glycol, and triethylene glycol, aromatic diols such as 1,4-cyclohexane dimethanol, poly(oxyalkylene)glycols such as polyethylene glycol, polypropylene glycol and polytetramethylene glycol, are mentioned.

Kindly replace paragraph [0150] with the following:

~~And, as~~ As the chain extender, pendant carboxyl group containing diols, or glycols such as ethylene glycol, diethylene glycol, propylene glycol, 1,4-butanediol, hexamethylene glycol and neopentyl glycol, or diamines such as ethylenediamine, propylenediamine, hexamethylenediamine, phenylenediamine, tolylenediamine, diphenyl diamine, diamino diphenylmethane, diamino diphenylmethane, and diamino cyclohexyl methane, etc., are mentioned.

Kindly replace paragraph [0152] with the following:

~~And, when~~ When an anchor layer is formed, in order to improve film form ability and adhesive strength with the white film, it is preferable to add to the above-mentioned coating material, as water-soluble organic solvent, at least one or more kinds of organic solvents selected from N-methyl pyrrolidone, ethyl cellosolve acetate and dimethylformamide, etc. In particular, N-methyl pyrrolidone is preferable since its effect of improving film formability and adhesive strength is significant.

Kindly replace paragraph [0159] with the following:

~~In order to~~ To improve adhesion strength with the white film of the first to fourth configurations ~~of this invention~~, it is preferable to add an amine based compound to the anchor layer (coating material). As an example of the amine based compound used as cross linking agent, "BEKKAMIN" (type name: APM etc.) produced by Dainippon Ink & Chemicals, Inc., etc., is mentioned. It is preferable that the amount to be added of the above-mentioned cross linking agent is 1 to 15 parts by weight per 100 parts by weight of the mixed coating material of said water-soluble polyester urethane based resin and the water-soluble organic solvent, in view of improving chemical resistance and preventing aggravation of waterproof property, and more preferably, it is 3 to 10 parts by weight. If the added amount of the cross linking agent is under the above-mentioned range, an adhesion improvement effect may not be acquired, and if it exceeds the above-mentioned range, the adhesive strength between the anchor layer and the white film may decrease, presumably due to unreacted cross linking agent remained.

Kindly replace paragraph [0160] with the following:

In addition, ~~in order to~~ completely crosslink and cure the above-mentioned skin layer composition during the time for forming the white film of the first to fourth configurations ~~of this invention~~, in the anchor layer (coating material), a small amount of crosslinking accelerator may be added.

Kindly replace paragraph [0164] with the following:

It is preferable that the glossiness of the receiving layer surface of the receiving sheet for thermal transfer recording after coating the receiving layer on the white film ~~of this invention~~ is 50% or more since an image becomes clear, when the image is printed on the receiving sheet. The glossiness of the receiving layer surface is, more preferably, 70% or more. Since, as the glossiness of the receiving layer surface becomes higher, the above-mentioned effect becomes higher, which is preferable, an upper limit is not determined.

Kindly replace paragraph [0165] with the following:

The receiving sheet for thermal transfer recording using the white film of the first to fourth configuration ~~of this invention~~ may be a receiving sheet in which the white film is used alone, or may be a receiving sheet to which other material is laminated. As the above-mentioned other material, although not limited thereto, for example, papers such as an ordinary paper, a high quality paper, a middle grade paper, a coated paper, an art paper, a cast coated paper, a resin

impregnated paper, an emulsion impregnated paper, a latex impregnated paper, synthetic resin containing paper, a glassine paper and a laminated paper, synthetic papers, nonwoven fabrics or other type films are mentioned.

Kindly replace paragraph [0166] with the following:

Moreover, in the case where the other material is laminated to the white film ~~of this invention~~, it is preferable to laminate it to the surface opposite to the surface to be provided with the receiving layer, since curl of the receiving sheet for thermal transfer recording can be made small.

Kindly replace paragraph [0167] with the following:

~~And, it~~ It is preferable that the glossiness of a receiving layer surface after coating the receiving layer on the white film of the first to fourth configuration ~~of this invention~~ is 50% or more, since a character or an image transferred becomes clear, and it is, more preferably, 70% or more.

Kindly replace paragraph [0168] with the following:

For manufacturing the white film of the first to fourth configurations ~~of this invention~~, longitudinal-transverse or transverse-longitudinal sequential biaxial stretching method, simultaneous biaxial stretching method, and further, re-stretching after biaxial stretching, etc., can be used and, although it is not especially limited, it is preferable to use the longitudinal-transverse sequential biaxial stretching method which is excelled in productivity and applicability of apparatus. An example of the manufacturing method of the white film ~~of this invention~~ in which a longitudinal-transverse sequential biaxial stretching method is applied, is explained below, but this ~~invention~~ disclosure is not limited only to this example.

Kindly replace paragraph [0172] with the following:

In order to complete crystal orientation of thus obtained biaxially oriented white polypropylene film and to impart smoothness and dimensional stability, it is successively heat treated in a tenter at 140 to 170°C for 1 to 30 seconds, and then after cooled gradually and uniformly, by cooling to a room temperature and being wound, the white film of this invention can be obtained. ~~Here, in~~ In the above-mentioned heat treatment process, 3 – 12 % relaxation treatment may be carried out to the transverse or longitudinal direction, if necessary. In addition, the biaxial stretching may be either of sequential biaxial stretching or simultaneous biaxial

stretching, and after the biaxial stretching, the film may be re-stretched in any of longitudinal and transverse directions.

Kindly replace paragraph [0173] with the following:

[Biaxially oriented white film of the second to fourth configurations of this invention]

In a multi-layer film formation apparatus having an extruder (a) and extruder (b), polypropylene resin as raw material for the above-mentioned A layer is fed to the extruder (a) to introduce into the multi-layer T-die. On the other hand, as raw material for B layer, the above-mentioned polyolefin based resin or polypropylene resin (homopolypropylene, polypropylene resin copolymerized with 5 % by weight or less of ethylene or α -olefin, or polypropylene resin having half crystallization time ($t_{1/2}$) of 60 seconds or less) is fed to the heated extruder (b), molten and kneaded at 180 to 280°C, then after filtered by a filter, introduced into the multi-layer T-die to thereby laminate to one or both surfaces. At this time, in order to laminate the above-mentioned other layer, C layer, an extruder (c) is separately prepared and a resin for the C layer is molten and kneaded at 180 to 280°C, and after filtered by a filter, it may be laminated in the multi-layer T-die to the surface opposite to the resin layer for B layer.

Kindly replace paragraph [0174] with the following:

The multi-layer sheet to which this molten polymer is laminated is extruded, and solidified by closely contacting with a drum surface of which surface temperature is kept at 90 to 130°C (~~skilled in the art says this process as casting process~~). Hereafter, the each layer constituting the above-mentioned multi-layer sheet which corresponds to A layer, B layer or C layer of the white film is called as Ac layer, Bc layer or Cc layer. The Thickness thickness constitution of the Ac layer, Bc layer and Cc layer and thickness of the film can be controlled by the amount of extrudate of molten polymer from each extruder. At this time, as the drum temperature becomes higher, the amount of generation of β -crystal of the Ac layer becomes larger, therefore the specific gravity after biaxial stretching decreases, but if it is too high, sheet may stick to the drum, or a crater-like defect may generate on the surface of the sheet which contacts with the metal drum (hereafter, may be abbreviated simply as D side) after biaxial stretching. In the above-mentioned three-layered constitution of Bc layer/Ac layer/Cc layer, if the sheet is made to closely contact in Bc layer with the metal drum (Bc layer side of sheet confronts to D side), even if the drum temperature is elevated, or the drum rotating speed is made high, the sheet will not stick to the drum, and the amount of β -crystal generation of the undrawn

sheet can be kept high. In addition, a crater-like defect does not generate on B layer surface after biaxial stretching.

Kindly replace paragraph [0175] with the following:

At this time, it is preferable that the contact time onto metal drum is 3 to 60 seconds. ~~Here, the~~ The contact time onto metal drum means, in the above-mentioned casting process, making the time at which molten polymer contacts first with drum surface as starting time (= 0 second), the time which needs until the time at which the undrawn sheet leaves the drum. If the contact time is less than the above-mentioned range, at the above-mentioned leaving point, the undrawn sheet may stick to the drum, or because the amount of β -crystal which generates in the undrawn sheet is small (because the β -crystal ratio of the undrawn sheet is low), specific gravity of the film after biaxial stretching may increase more than necessary. If the contact time exceeds the above-mentioned range, although it depends on size of metal drum, rotating speed of drum is low more than necessary, and productivity may greatly decreases. The contact time onto metal drum is, more preferably, 5 to 45 seconds, still more preferably, 7 to 20 seconds.

Kindly replace paragraph [0177] with the following:

~~Here, in~~ In the air knife method, air is blasted on the side of sheet which does not contact with metal drum (hereafter, it may simply be abbreviated as ND side). It is preferable that this air temperature is 10 to 130°C, and by the air temperature, surface glossiness can be controlled, and glossiness increases as the air temperature becomes low.

Kindly replace paragraph [0179] with the following:

~~Here, the~~ The above-mentioned film temperature and longitudinal draw ratio are important for controlling the specific gravity of the film after biaxial stretching. That is, as the film temperature becomes high, the specific gravity becomes low, and as the drawing ratio becomes high, the specific gravity becomes low. Moreover, there is capacity in the motor which drives the rolls. By suppressing the drawing stress ~~low~~, it becomes possible to draw by a motor of low capacity[.], ~~thus~~ Thus, a plant investment becomes unnecessary. In the white film of ~~this invention~~, as mentioned above, even at a high speed casting it is possible to increase β -crystal ratio while preventing sticking and defect. Therefore, it is possible to suppress drawing stress ~~low~~ because it is possible to achieve a predetermined specific gravity after biaxial stretching even if the film temperature is set high or the longitudinal draw ratio is set low.

Kindly replace paragraph [0181] with the following:

~~Here, it~~ It is preferable that the areal drawn ratio (longitudinal draw ratio x transverse draw ratio) of longitudinal-transverse biaxial stretching is 15 times to 84 times, and in view of film formability, 30 to 60 times. If the areal draw ratio is less than the above-mentioned range, the glossiness of the white film after biaxial stretching is low, or the amount of generation of void is insufficient and film performance of this invention cannot be obtained. On the other hand, if the areal draw ratio exceeds the above-mentioned range, a lot of film breakage may occur at stretching process.

Kindly replace paragraph [0182] with the following:

~~In order to~~ To complete crystal orientation of thus obtained biaxially oriented white polypropylene film and impart smoothness and dimensional stability, it is successively heat treated in a tenter at 140 to 170°C for 1 to 30 seconds, and then after cooled gradually and uniformly, by cooling to a room temperature and being wound, the white film ~~of this invention~~ can be obtained. ~~Here, in~~ In the above-mentioned heat treatment process, 3 – 12 % relaxation treatment may be carried out to the transverse or longitudinal direction, if necessary.

Kindly replace paragraph [0183] with the following:

The surface of the white film ~~of this invention~~ thus obtained is, when it is coated with a receiving layer or it is laminated with the other substrate, subjected to a corona discharge treatment in the above-mentioned atmospheric gas to improve interlayer adhesion strength, and wound.

Kindly replace paragraph [0184] with the following:

~~Here, it~~ It is possible in the production process of the white film to provide an anchor layer. That is, an inline coating method in which an acryl based resin, polyester based resin, polyurethane based resin or the like is coated on the above-mentioned longitudinally drawn film and the film is successively introduced into a tenter to draw transversely and dried, is preferably used since it is possible to provide an anchor layer in low cost. In the inline coating method, before providing the anchor layer, it is preferable that a corona discharge treatment is carried out beforehand to the surface to be provided the anchor layer, because it can increase adhesion strength between the white film and the anchor layer. As a matter of course, the anchor layer can be provided also by an offline coating method.

Kindly replace paragraph [0185] with the following:

[Measuring Method and Evaluation Method of Properties]

The properties of ~~this invention~~ are determined according to the following evaluation method and standard.

- (1) Judgment that A layer has substantially non-nucleus voids

Kindly replace paragraph [0186] with the following:

By freeze microtome method, a cross sectional sample of the white film in transverse direction-thickness direction was obtained at -100°C. After coating Pt on the cross section of the white film obtained, the cross section is observed by a scanning electron microscope (SEM) under the following conditions and a cross-sectional image is obtained. ~~Here, preparation~~ Preparation of sample and observation of cross section were carried out by Toray Research Center, Inc. (TRC).

- Equipment: super high-resolution field emission scanning electron microscope (UHR-FE-SEM S-900H) produced by Hitachi, Ltd.
- Acceleration voltage: 2kV
- Observation magnification: 5000 times.

Kindly replace paragraph [0187] with the following:

Using the obtained cross-sectional image, all voids (independent void which has a boundary line) per 1000 μm^2 cross section were counted. Furthermore, the void which has a nucleus inside among all voids was counted, and the ratio of the number of voids which has a nucleus in inside per total number of voids was calculated in percentage (unit: %). ~~Here, the~~ The cross-sectional images were obtained only for required number so that 1000 μm^2 observation area could be secured while changing observation portion.

Kindly replace paragraph [0188] with the following:

~~In this invention, the~~ The A layer was observed by the above-mentioned method, and when the ratio of the number of voids which has a nucleus inside per total number of voids was 5 % or less, it was judged that said A layer has substantially non-nucleus voids, and was expressed as "o". On the other hand, the case where it exceeds 5 %, it was expressed as "x".

Kindly replace paragraph [0190] with the following:

- (2) Half crystallization time ($t_{1/2}$)

It is measured according to JIS K 7122 (1987) using Thermal analyzer RDC220 type produced by Seiko Instruments Inc. A whole resin of B layer 5 mg (sample) was heated to 280°C at a rate of 50°C/min under nitrogen atmosphere. After completion of the temperature elevation, it was kept at 280°C for 5 minutes. Successively, it was cooled to 125°C at a rate of 50°C/min. After the completion of the cooling, it was kept at 125°C and the sample was crystallized under the same temperature. At this time, the time at which the temperature arrives first at 125°C is put as starting time (= 0 min). After that an endothermic peak appears accompanying crystallization. ~~In this invention, in~~ In a calorimetric curve of which horizontal line denotes time, measurement was carried out by defining $t_{1/2}$ as the time from the starting time to the time of the highest point of the exothermic peak (unit: second). ~~Here, in~~ In a calorimetric curve of which horizontal line denotes time, when the exothermic peak appears before the above-mentioned starting time, namely, when the crystallization speed is extremely high such that it cannot be measured by this method, it is considered as 0 second. ~~Here, as~~ A shape of the sample, if it is whole resin of B layer, any shape may be allowed, but, it is preferable to be a chip. Or, the sample may be prepared by cutting out a necessary amount of B layer by a cutter knife or the like, from the skin layer of the white film (B layer). The same measurement is repeated five times for a same sample, and average value of the obtained $t_{1/2}$ was considered as $t_{1/2}$ of said sample.

Kindly replace paragraph [0192] with the following:

(4) Confirmation of β -crystal activity

[Confirmation of the whole film]

It is measured according to JIS K 7122 (1987) using Thermal analyzer RDC220 produced by Seiko Instruments Inc. A 5 mg white film (sample) was enclosed and loaded in an ~~aluminium~~ aluminum pan and it was set to said instrument. Under nitrogen-gas-atmosphere, the temperature was elevated from 30°C to 280°C at a rate of 10°C/min (hereafter, the calorimetric curve obtained at this time may be abbreviated as “first-run calorimetric curve”). After completion of the temperature elevation, it was kept for 5 minutes at 280°C. Successively, it was cooled to 30°C at a rate of 10°C/min. After completion of the cooling, it was kept for 5 minutes at 30°C. Next, temperature was elevated to 280°C at a rate of 10°C/min (hereafter, the calorimetric curve obtained at this time may be abbreviated as “second-run calorimetric curve”). At this time, in the calorimetric curve of the second run obtained, when an endothermic peak

accompanying fusion of β -crystal was observed at 140°C or higher and lower than 160°C, it was judged that said film (raw material polypropylene) has β -crystal activity. An endothermic peak here means a peak of which amount of heat of fusion is more than 10 mJ/ mg. ~~And, the~~ The amount of heat of fusion was an area surrounded by the base line and the calorimetric curve from where the calorimetric curve shifts to endothermic side and until subsequently returns to the location of the base line according the temperature elevation and it was determined by stretching a straight line from the position of fusion initiation temperature to the intersection with the calorimetric curve in high temperature side, and this area was computer-processed. ~~Here, when~~ When the calorimetric curve shifts to an endothermic side, and does not return to the position of base line completely but shifts to an endothermic side again, the amount of heat of fusion may be defined as, by stretching a perpendicular line from the maximum point which begins to shift to an endothermic side again to the base line, the area surrounded by the calorimetric curve, the base line, and the perpendicular line.

Kindly replace paragraph [0193] with the following:

~~And, in-~~ In the above-mentioned method, in case where there is a peak between 140 to 160°C, but it is not clear whether or not the peak is based on the fusion of β -crystal, it may be determined that there is β -crystal activity by the facts that there is a peak in 140 to 160°C and that, in the diffraction profile by wide angle X-ray diffraction method, there is a diffraction peak based on β -crystal.

Kindly replace paragraph [0195] with the following:

In the obtained diffraction profile, a diffraction peak with the strongest diffraction intensity from the (300) plane based on β -crystal should be observed near $2\theta = 16.1$ to 16.4° . ~~Here, regarding~~ Regarding the structure of crystal polymorphs of polypropylene (α -crystal, β -crystal), the wide angle X diffraction profile obtained, etc., there are many reports such as, for example, Edward, P, Moore, Jr. "Polypropylene Handbook", published by Kogyo Chosakai (1998), p.135 -163; Hiroyuki Tadokoro, "Structure of Polymer", published by Kagaku-Dojin (1976), p.393; Turner Jones (A. Turner-Jones) et al. "Macromolekulare Chemie" (Macromol.Chem.), 75, p.134 to 158, and including the references cited by these, and they may be referred to.

Kindly replace paragraph [0197] with the following:

~~In this invention, those~~ Those having β -crystal activity was classified as "o", and those not having β -crystal was classified as "x".

Kindly replace paragraph [0198] with the following:

[Confirmation of B layer]

By the same method mentioned above, a calorimetric curve was obtained for the whole resin of B layer and judged. ~~Here, regarding~~ Regarding shape of sample, as long as it is the whole resin of B layer, any shape may be allowed, but it is preferable to be a chip because handling is easy. Or, the sample may be prepared by cutting out a necessary amount of B layer by a cutter knife or the like, from the skin layer of the white film (B layer).

Kindly replace paragraph [0200] with the following:

~~Here, the~~ The samples are piled in same direction and after adjusted to about 1 mm thickness, cut into 1 mm width and provided for the measurement.

Kindly replace paragraph [0202] with the following:

~~Here, distinction~~ Distinction of non orientation, uniaxial orientation, and biaxial orientation can be judged by, for example, as explained by Kiyokazu Matsumoto et al. "The Journal of Society of Fiber Science and Technology, Japan", 26th volume, No. 12, 1970, p537 to 549; Kiyokazu Matsumoto "Making Film" published by Kyoritsu Shuppan (1993), P.67 to 86; Seizo Okamura et al "Kobunshi Kagaku Joron (the second edition)", published by Kagaku-Dojin (1981), p.92 to 93, etc., the following criteria.

- Non orientation: the Debye Scherrer ring which has substantially almost equal intensity in X-ray diffraction photograph in any incidence direction is obtained.
- Longitudinal uniaxial orientation: the Debye Scherrer ring which has substantially almost equal intensity in X-ray diffraction photograph in end incidence is obtained.
- Biaxial orientation: in X-ray diffraction photograph of any direction, a diffraction image which reflects its orientation and is not equal in diffraction intensity, is obtained.

Kindly replace paragraph [0203] with the following:

~~In this invention, The~~ film should meet the criteria of the above-mentioned biaxial orientation.

Kindly replace paragraph [0204] with the following:

(6) Crystallization temperature (T_c) and melting temperature (T_m)

They were measured according to JIS K 7122 (1987) using Thermal analyzer RDC220 type produced by Seiko Instruments Inc. The main peak temperature of endothermic peak accompanying the melt of resin is defined as the melting temperature (T_m), when whole resin of 5 mg (film sample) was heated to 280°C at a rate of 10°C/min under nitrogen atmosphere. After completion of the temperature elevation, it was kept at 280°C for 5 minutes. Successively, it was cooled to 30°C at a rate of 10°C/min. At this time, the peak temperature of exothermic peak accompanying crystallization from the molten state was defined as the crystallization temperature (T_c) (unit: °C). ~~Here, it~~ It is preferable that the sample is chip-shaped if it is the whole resin of A layer and B layer, but if it is of the white film of the second to fourth configurations, ~~in order~~ to determine T_c and T_m of each layer, it may be prepared by cutting out a necessary amount from the skin layer (B layer) with a cutter knife or the like, based on the image obtained when the void ratio of skin layer (B layer) mentioned below (7) was determined and based on the thickness of each layer determined by the description (19) below. The same measurement was carried out 5 times for the same sample and the average values of T_c and T_m were defined as T_c and T_m of said sample.

Kindly replace paragraph [0211] with the following:

(9) Average surface roughness (R_a)

Based on JIS B 0601 (2001), it was measured using a stylus type surface roughness meter. ~~Here, using~~ Using the high precision thin film level difference measuring instrument (type: ET-30HK) and the three-dimensional roughness analyzer (type: SPA-11), produced by Kosaka Laboratory Ltd., it was measured, for the first configuration, on the drum side (D side) surface of the white film and for the second to fourth configurations, for the surface of B layer of the white film, by the following conditions.

- Stylus scanning direction: transverse direction of film
- Measurement mode: Stylus system (STYLUS)
- Processing mode: 8 (ROUGHNESS)
- Measurement length: 1mm
- Diameter of stylus: conical 0.5 μmR
- Load: 16mg

- Cut-off: 250 μm
- Number of measurement Line: 30 lines
- Scanning speed: 100 $\mu\text{m}/\text{second}$
- Pitch: X direction 4 μm , Y direction 10 μm
- SLOPE COMP: ON
- GAIN: $\times 1$
- Measurement area: 0.2988 mm^2
- Standard area: 0.1 mm^2 .

Kindly replace paragraph [0225] with the following:

In addition, when it is necessary to determine β -crystal ratio of the core layer (A) and of the skin layer (B) separately, after checking the thickness configuration by the section observation by SEM carried out in the above-mentioned (7) and the thickness constitution by (19) described below, the skin layer (B) is shaved off and the peak of fusion is measured for each layer. ~~Here, the~~ The skin layer (B) is shaved off by a single-edge, or after cutting by a single edge on the surface of the film surface and after bonding an adhesive tape on the film surface, the skin layer (B) can be exfoliated by rapidly pulling the adhesive tape along the film. Next, from the thickness determined by the above-mentioned cross-sectional observation by SEM, 80% of the thickness from said exfoliated film is made as sample. Regarding the core layer (A), similarly, cutting by a single edge to the middle of the film thickness and after bonding adhesive tapes on both surfaces of the film, then the film can be halved in thickness by simultaneously pulling them so that the film is exfoliated. A sample is made by shaving off the middle part of the halved film.

$$\text{B-crystal ratio (\%)} = \{ \Delta H_{u-1} / (\Delta H_{u-1} + \Delta H_{u-2}) \} \times 100$$

Kindly replace paragraph [0226] with the following:

(16) Glass transition temperature (T_g)

It is measured according to JIS K 7122 (1987) using Thermal analyzer RDC220 produced by Seiko Instruments Inc. A 5 mg sample was enclosed and loaded in an aluminium pan and it was set to said instrument. Under nitrogen-gas-atmosphere, the temperature was elevated from 30°C to 280°C at a rate of 20°C/min. After completion of the temperature elevation, it was kept for 5 minutes at 280°C. Successively, it was cooled to 30°C at a rate of 20°C/min. After completion of the cooling, it was kept for 5 minutes at 30°C. Next, temperature was elevated

again to 280°C at a rate of 20°C/min. In the calorimetric curve obtained at this time, the starting point of glass transition is defined as the glass transition temperature (T_g) (temperature: °C). ~~Here, for the analysis, the~~ The program installed in the thermal analysis system SSC5200 made by Seiko Instruments Co., Ltd. was used. The same measurement was carried out 5 times and average value of T_g obtained was defined as the T_g of said sample.

Kindly replace paragraph [0228] with the following:

Using the obtained image, minor and major axis of all the immiscible resin that exists in area of 1000 μm² were measured and the averages of all of these was defined as the average dispersed diameter of immiscible resin (unit: μm). ~~Here, the~~ The major or minor axis is, in the configuration of each void observed in the cross section, length of the largest part or of the smallest part, respectively.

Kindly replace paragraph [0235] with the following:

(22) Cushion factor

A dial ~~gage~~ gauge type thickness meter (JIS B 7503 (1997), UPRIGHT DIAL GAUGE (0.001 x 2mm) No. 25 produced by PEACOCK, ~~gage~~ gauge head 5 mmφ flat type) is equipped with a dial ~~gage~~ gauge stand (No. 7001 DGS-M). The film thickness obtainable by this (d₀) is measured. Furthermore, the thickness when 500gf load is applied to a dial ~~gage~~ gauge press element (d₅₀₀) is measured, and the cushion factor was calculated by the following formula (unit: %).

$$\text{Cushion factor (\%)} = \{(d_0 - d_{500}) / d_0\} \times 100$$

Kindly replace paragraph [0237] with the following:

(23) Thickness of film

Using the dial ~~gage~~ gauge type thickness meter (JIS B 7503 (1997), UPRIGHT DIAL GAUGE (0.001 x 2mm) No. 25 produced by PEACOCK, gage head 5 mmφ flat type, 125 gf load), measurements are made at ten points at intervals of 10cm in longitudinal direction and transverse direction and the average thereof is defined as the thickness of film of said sample (unit: μm).

Kindly replace paragraph [0247] with the following:

(30) Sensitivity

The white film ~~of this invention~~ is pasted to a paper of 150 μm thickness. Then, using a micro gravure coater, the following coating materials for forming a receiving layer on the film

surface were applied such that the amount of coating after drying is 3 g/m², and the receiving sheet for thermal transfer recording was prepared.

[Coating liquid for receiving layer formation]

Polyester resin (Vylon 200 produced by Toyobo Co., Ltd.): 20 parts

Silicone oil (X-22-3000T produced by Shin-Etsu Chemical Co., Ltd.): 2 parts

Toluene: 39 parts

Methyl ethyl ketone: 39 parts.

Kindly replace paragraph [0255] with the following:

[Example]

~~This invention is~~ Our films are explained by the following examples, but this ~~invention disclosure~~ is not limited thereto. Here, in order to obtain the film which has a desired thickness configuration, polymer extrusion output from each extruder was adjusted to predetermined value. It was measured on f(D) side.

Kindly replace paragraph [0260] with the following:

The resin composition of the biaxially oriented white polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. Since the properties of this white film are in ~~the our range of this invention~~, it turns out that it is excellent as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0265] with the following:

The resin composition of the biaxially oriented white polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. By adding m-LLDPE, it becomes possible to draw under a lower temperature compared to the stretching condition of the homopolypropylene of Example 1, and as the result, void ratio of the film increases and the sheet becomes excellent in flexibility and crease resistance, although whiteness, optical density and cushion factor are also high. Since the properties of this white film are in ~~the our range of this invention~~, it turns out that it is excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0267] with the following:

The resin composition was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. Similar to the film of Example 2, void ratio of the film is high and the sheet is excellent in flexibility and crease resistance, although whiteness, optical density and cushion factor are also high. Since the properties of this white film are in the our range of ~~this invention~~, it turns out that it is excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0269] with the following:

The resin composition was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. Similar to the film of Example 2, void ratio of the film is high and the sheet is excellent in flexibility and crease resistance, although whiteness, optical density and cushion factor are also high. Since the properties of this white film are in the our range of ~~this invention~~, it turns out that it is excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0274] with the following:

The resin composition of the biaxially oriented white polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. By laminating the skin layers, surface glossiness and crease resistance are further improved. In addition, since the properties of this white film are in the our range of ~~this invention~~, it turns out that it is excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0275] with the following:

(Example 7)

After carrying out a corona discharge treatment to the D side of the film longitudinally drawn in Example 1, as a B layer, a polyester urethane based water-dispersed resin "HYDRAN" AP-40F (produced by Dainippon Ink & Chemicals, Inc., solid content 30%; hereafter, abbreviated as PEU), 100 parts by weight and, as a water soluble organic solvent, N-methyl pyrrolidone, 15 parts by weight were mixed to prepare coating material. To the mixture, a melamine compound "BEKKAMIN" APM (produced by Dainippon Ink & Chemicals, Inc.), 5 parts by weight was added as a crosslinking agent, and further, as a crosslinking accelerator, a

water-soluble, acidic compound "CATALYST" PTS (Produced by Dainippon Ink & Chemicals, Inc.), 2 parts by weight and a spherical silica particle of 0.1 μm of average diameter, 0.2 parts by weight were added and mixed to prepare a coating material. Thus prepared coating material was coated by a coating bar to a thickness of 6 μm , and successively, the coated film was transversely drawn 10 times by the same way as Example 1 to obtain a biaxially oriented white polypropylene film. The thickness constitution of this film was B layer/A layer = 0.2 μm /35 μm . Next, the receiving sheet for thermal transfer recording was obtained by the same way as Example 2. The resin composition of the biaxially oriented polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. ~~Here, the~~ The color tone and the average surface roughness of this film were measured on the B layer surface side. By laminating the B layer, surface glossiness and crease resistance are further improved. In addition, since the surface became smooth, it turns out that it was excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0276] with the following:

(Example 8)

A receiving sheet for thermal transfer recording was prepared in the same way as Example 2, except that, on one surface of the biaxially oriented white polypropylene film obtained in Example 2, as a B layer, the mixed coating material of Example 7 was coated by an off-line gravure coater, hot air dried at 110°C to form a B layer of 1 μm thickness, and the dried film was wound. The resin composition of the biaxially oriented white polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. By laminating the B layer, surface glossiness and crease resistance are further improved. In addition, since the properties of this white film are in the our range of this invention, it turns out that it is excellent in sensitivity as a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0278] with the following:

Then, the film drawn in the MD direction was introduced in a tenter by grasping both ends of the film with clips and was drawn 9 times in the direction perpendicular to the MD direction (transverse direction; hereafter, abbreviated as TD direction) (areal drawn ratio: longitudinal draw ratio x transverse draw ratio = 45 times) in an atmosphere heated to 150°C.

Successively, ~~in order~~ to complete the crystal orientation of the biaxially oriented white polypropylene film to thereby impart smoothness and dimensional stability, relaxation heat treatment of 8 % in transverse direction was performed at 160°C in the tenter, and, after cooking slowly and uniformly, cooled to room temperature. Furthermore, in order to provide on the surface of the white film ~~of the invention~~ a coating of receiving layer or other substrate, corona discharge treatment on both sides was performed in air to thereby make the wet tension into 37 mN/m and the treated film was wound.

Kindly replace paragraph [0279] with the following:

The thickness constitution of said laminate film thus obtained was B layer/A layer/B layer = 3/29/3 μm and it was confirmed that many fine non-nucleus voids were formed in the A layer and the B layer contained in its inside fine voids of 0.5 μm having PMP as its nucleus. Next, a receiving sheet for thermal transfer recording was obtained in the same way as Example 5. The resin composition of the biaxially oriented polypropylene film thus obtained was shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. Since the film ~~of this invention~~ has high glossiness and whiteness and the L, a, **b** values are in the our range ~~of this invention~~, it turns out that it is excellent for a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0281] with the following:

The resin composition of the biaxially oriented polypropylene film thus obtained is shown in Table 1, and the properties of the film and the properties of the receiving sheet for thermal transfer recording were shown in Tables 2 and 3. Since the β -crystal ratio of the β -crystal PP of this film is low, the void ratio inside the film is low and not uniform, accordingly, the specific gravity is high and F2 value is high and inferior in crease resistance. In addition, whiteness, optical density, OD, and cushion factor are low, the L, a, **b** values are out of ~~the our~~ range ~~of this invention~~, the thermal conductivity is high and it is inferior in sensitivity for a receiving sheet for thermal transfer recording.

Kindly replace paragraph [0292] with the following:

From Tables 1 to 3, the white film of the first to third configuration ~~of this invention~~ has substantially non-nucleus and uniform and fine void, and void ratio, surface glossiness and F2 value are controlled in a moderate range. Thereby, without worsening crease resistance, glossiness is high, cushion factor is high, and optical property is excellent. Moreover, since

glossiness and F2 value become still higher by laminating B layer on A layer with substantially non-nucleus, uniform and fine void, the film can be manufactured stably and it excels in productivity. These properties can be controlled by raw material composition or by film production conditions.

Kindly replace paragraph [0298] with the following paragraph:

The molten polymer laminate thus obtained, was extruded from the T-die so that the B layer contacts with a metal drum, and solidified on the metal drum maintained at 120°C, and formed into a shape of sheet. At this time, the sheet was closely contacted with the drum by blasting air of 60°C from ND side of the sheet using an air knife. ~~Here, the~~ The contact time of the sheet with the drum was 20 seconds.

Kindly replace paragraph [0302] with the following paragraph:

~~And, the~~ The thickness constitution of the obtained white film is A layer/B layer = 20/5 μm .

Kindly replace paragraph [0309] with the following paragraph:

The molten polymer laminate thus obtained, was extruded from the T-die so that the B layer contacts with a metal drum, and solidified on the metal drum maintained at 110°C, and formed into a shape of sheet. At this time, the sheet was closely contacted with the drum by blasting air of 60°C from ND side of the sheet using an air knife. ~~Here, the~~ The contact time of the sheet with the drum was 20 seconds.

Kindly replace paragraph [0331] with the following:

~~Here, wet~~ Wet tension of the B layer surface of the obtained white film was 37 mN/m, and wet tension of the C layer surface was 42 mN/m. In addition, the thickness constitution of the film is B layer/A layer/C layer = 3/29/3 μm .

Kindly replace paragraph [0347] with the following:

(Example 18)

A biaxially oriented white polypropylene film was prepared in the same conditions as Example 17, except increasing the rotating speed of the metal drum. ~~Here, the~~ The contact time with the metal drum was 10 seconds. In addition, using the white film as a substrate, a receiving sheet was prepared by forming a receiving layer on the C layer, which is ND side, in the same conditions as Example 10.

Kindly replace paragraph [0367] with the following:

The results are shown in Tables 4 to 7. The obtained white film did not stick to metal drum, and was excellent in film forming ability·processibility. ~~And, a A~~ crater-like defect was not observed on the surface of the film after biaxial stretching. Reflecting this, the surface roughness of the B layer was small, and the glossiness was high. In addition, because it had substantially non-nucleus, uniform and fine void, the specific gravity was low and the cushion factor was high in an extent such that the crease resistance would not decrease. In addition to that, by forming a receiving layer on the anchor layer, which is excellent in adhesion to the receiving layer, the adhesion to the receiving layer was significantly high, and the receiving sheet for thermal transfer recording prepared by using such a white film as a substrate, was significantly high in sensitivity.

Kindly replace paragraph [0368] with the following:

From Tables 4 to 7, the white film of the fourth configuration ~~of this invention~~ has β -crystal activity, in which B layer of which crystallization speed is high is laminated to A layer which has substantially non-nucleus, uniform and fine voids, and its specific gravity is controlled in an adequate range. By this, without damaging its crease resistance, it is possible to manufacture a film of which surface roughness is small, glossiness is high, cushion factor is high and optical properties are good. In addition to that, these properties can be controlled by raw material composition or film forming conditions.

Kindly replace paragraph [0376] with the following:

(Comparative example 9)

A biaxially oriented micro-porous film having 35 μm thickness was prepared in the same conditions as Comparative example 7, except that the whole resin of A layer used in Example 10 was used. ~~And, using~~ Using the obtained micro-porous film as a substrate, a receiving sheet was prepared by forming a receiving layer on the surface of D side in the same conditions as Example.

Kindly replace paragraph [0385] with the following:

(Comparative example 12)

It was tried to prepare a biaxially oriented white polypropylene film in the same conditions as Comparative example 10, except that the line speed was increased by increasing

rotating speed of the metal drum. ~~And, the~~ The contact time with the metal drum was 13 seconds.

Kindly replace paragraph [0387] with the following:

(Comparative example 13)

It was tried to prepare a biaxially oriented white polypropylene film in the same conditions as Comparative example 12, except that the rotating speed of the metal drum was further increased. ~~And, the~~ The contact time with the metal drum was 10 seconds.

Kindly replace paragraph [0395] with the following:

The molten polymer laminate thus obtained, was extruded from the T-die so that the B layer contacts with a metal drum, and solidified on the metal drum of which surface temperature was maintained at 80°C, and formed into a shape of sheet. At this time, the sheet was closely contacted with the drum by blasting air of 30°C from ND side of the sheet using an air knife. ~~Here, the~~ The contact time of the sheet with the drum was 20 seconds.

Kindly replace paragraph [0406] with the following:

The molten polymer laminate thus obtained, was extruded from the T-die so that the B layer contacts with a metal drum, and solidified on the metal drum of which surface temperature was maintained at 120°C, and formed into a shape of sheet. At this time, the sheet was tightly contacted with the drum by blasting air of 60°C from ND side of the sheet using an air knife. ~~Here, the~~ The contact time of the sheet with the drum was 20 seconds.

Kindly replace paragraph [0408] with the following:

~~Here, the~~ The thickness constitution of the obtained white film was B layer/A layer/B layer = 2.5/30/2.5 μm .

Kindly replace paragraph [0412] with the following:

The above-mentioned whole resin of A layer was fed to a heated extruder (a), molten and kneaded at 200°C, filtered by a metal gaze filter of 60 μm cut, then, introduced to a monolayer T-die. Next, the molten polymer was extruded in a shape of sheet, solidified on a metal drum of which surface temperature was maintained at 90°C, and formed into a shape of sheet. At this time, the sheet was closely contacted with the drum by blasting air of 30°C from ND side using an air knife. ~~Here, the~~ The contact time of the sheet with the drum was 20 seconds.

Kindly replace paragraph [0434] with the following:

[Industrial applicability]

In the biaxially oriented white polypropylene film ~~of this invention~~, high sensitivity as substrate of a receiving sheet and high productivity which is strongly demanded for the receiving sheet for thermal transfer recording are compatible in a high level.

Kindly replace paragraph [0436] with the following:

In any of the above cases, the film of this invention may be used alone, or, in order to impart glossiness, heat sealability, adhesion, thermal resistance or releasing ability, may be used as a processed film in which other layer is laminated to the white film ~~of this invention~~.

Kindly replace paragraph [0437] with the following:

Thus, the white film ~~of this invention~~ can be widely used, not only, as a matter of course, for a receiving sheet for thermal transfer recording, but also for the above-mentioned wrapping use or industrial use.

Kindly replace paragraph [0438] with the following:

The biaxially orientated white polypropylene film ~~of this invention~~ can preferably be used for high sensitivity receiving sheet for thermal transfer recording since its glossiness and sum of F2 values of MD and TD are in the specific range, its specific gravity is low, its whiteness, optical density and cushion factor are high, and furthermore, taking advantage of these properties, can be used for food packing or labels.